Energy alternatives exist but at a higher price tag

By Joe Bauman
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The most environmentally sensitive and economical ways to reduce power consumption and improve air quality undoubtedly involve conservation and better efficiency.

But few experts maintain these tools by themselves will fill the gap between demand and generating capacity, or between global warming and clean air.

Among often cited alternatives to conventional power stations like coal and nuclear-fired plants are those running on the nonpolluting, renewable sources of solar, geothermal and wind power. All have advantages and drawbacks.

PacifiCorp, which does business in Utah as Rocky Mountain Power, has generating capacity of more than 9,000 megawatts. (As Rocky Mountain Power, it services Utah, Wyoming and Idaho. As Pacific Power, it operates in Oregon, Washington and California. The utility supplies most of Utah's electricity needs.)

Utah's demand for power during peak periods has risen from about 3,000 megawatts in 1996 to more than 4,000 megawatts in 2007, according to Rocky Mountain Power. (Without going into the complexities involving the amount of time turbines are operating, one megawatt supplies enough electricity for about 500 homes.) What it cannot produce, it must buy from other utilities.

As growth continues, purchased electricity can be expected to become scarcer and more expensive.

PacifiCorp estimates that unless new sources are used, it will have a power generating deficit in its six states of 750 megawatts by 2010. Should that trend continue, the deficit will pass 1,000 megawatts the next year, surge to nearly 2,500 megawatts by 2012, and reach 3,000 megawatts in 2016.

The need to step up power generation is obvious, assuming Americans aren't willing to suffer electrical blackouts or to deliberately set back the economy.

PacifiCorp has ruled out nuclear plants and additional coal-fired units in Utah for the time being, said Dave Eskelsen, spokesman for Rocky Mountain Power in Salt Lake City.

"In our current planning cycle, the need that we have for new resources is soon," he said. "A nuclear project, even if it were started today, would not be on line by the time we need it, which is 2012 and the years beyond that."

Conventional wisdom is that even if the approval process were expedited, it would take 15 years to complete the permitting process and build a nuclear power plant, according to Eskelsen.

That isn't to say the utility would never consider building one in Utah. "If our objective as a society is to move away from carbon-emitting resources, probably we'll have to consider nuclear in some form" eventually, he said.

PacifiCorp's decision not to add more coal-burning plants in Utah might involve the need to sell power from its grid to California, which is among the states it serves. California officials recently said they would not consider purchasing electricity produced by new coal plants unless the plants met an extremely strict limit: no more carbon dioxide released than is emitted by gas-fired plants.

Eskelsen said PacifiCorp wants to make sure regulators are inclined to approve the type of generating that the company does. "It's one of the reasons why in our current resource procurement initiative, we've removed the coal options," he said. The company is concerned that "if we were to build a coal-fueled project and then there would be an extensive carbon tax of one kind or another, either imposed by the state or federal government, that would make the project no longer 'least-cost, least-risk,'" he said.

"Least-cost, least-risk" is a standard required by utility regulators in the states PacifiCorp serves. If a plant is built that is considered outside the range of reasonableness, "we're subject to regulatory disallowance," he said. PacifiCorp could find itself docked by regulators.

"It kind of pushes us toward natural gas projects and wind power."

Rocky Mountain Power has several natural gas-powered generating stations in Utah. Two of the most recently built are near Mona, Juab County, and Vineyard. They can generate 520 megawatts to 569 megawatts, depending on weather conditions, he said. The Gadsby

Plant on North Temple, capacity 235 megawatts, was converted from coal to natural gas in the early 1990s. Three additional combustion turbines completed in 2002 have a combined output of 120 megawatts, Eskelsen said.

Rocky Mountain Power leases 200 megawatts from the West Valley plant, another gas-fired station, he said.

Natural gas for the plants comes from a variety of sources, much of it piped from oil and gas fields in Wyoming. But where does Rocky Mountain Power find that other source Eskelsen mentioned, wind power?

Wind power

"Because we have an integrated system across our six-state service area ... our generating resources are used by customers in all six states," said Jeff Hymas, another spokesman for Rocky Mountain Power. "So, for example, wind farms that we build in Wyoming serve customers in other states as well as Wyoming." Utah is among them.

Rocky Mountain Power has three 99-megawatt wind projects going through the permitting process in Wyoming, Hymas said. The Glenrock and Rolling Hills projects are on the site of a former PacifiCorp coal mine that was determined to be no longer economical and then reclaimed.

"The third is the Seven Mile Hill wind project, and that one is planned in Carbon County, Wyo., near Medicine Bow," he said. Each of the three wind farms can generate 99 megawatts of power using 66 turbines. They are due to be completed by the end of this year.

The huge Foote Creek I wind farm near Arlington, Wyo., boasts nearly 400 turbines capable of generating 600 kilowatts of electricity apiece. PacifiCorp has an interest in the Eugene, Ore., Water and Electric Board facility. According to a PacifiCorp Web site, the company owns 32.6 megawatts of the output.

Also near Arlington, Wyo., is the Rock River I wind project with 50 turbines, each capable of 1 megawatt of power production. "In 2001, PacifiCorp agreed to purchase all of Rock River I's output for the next 20 years," the site adds.

Another project from which PacifiCorp will be buying electricity is the wind farm being built at the mouth of Spanish Fork Canyon by Wasatch Wind Inc., based in Heber City. "That will be the first commercial wind project constructed in Utah," Hymas said.

Eskelsen said the project will feature eight turbines, each capable of generating around 2 megawatts. Its power will be sold to Rocky Mountain Power. Generation should come on line this summer, he said.

A Newton, Mass., company, UPC Wind, announced in December that it had signed an agreement to supply the city of Los Angeles 185 megawatts of electricity from a wind farm to be built in Utah's Milford Wind Corridor. The wind farm, with 80 generators capable of producing 2.5 megawatts each, will be on Bureau of Land Management and private land in Millard and Beaver counties, according to the company.

Tasco Engineering, based in Lehi, is developing a wind project on the Stockton Bar, an immense sandbar left in Tooele County by ancient Lake Bonneville. "The project is cited for 70 megawatts," said Gary Tassainer, the company's president.

"It looks like they will start construction in fall 2008," he said. Electricity generated by Tooele County's wind would go to Salt Lake City through PacifiCorp.

Mark Kot, county planner for Sweetwater County, Wyo., said Tasco is developing a project whose first 36 wind turbines were approved by the county commission on Oct. 2. They would be built on White Mountain, west of Rock Springs, and the power would go onto the western power grid through PacifiCorp.

"That project could go to about 100 turbines over the next five years," Tassainer commented.

Tasco also is developing the Bridger Butte wind project 20 miles east of Evanston, with 29 turbines producing electricity that will go mostly to the Wasatch Front, Tassainer said.

In deciding where to build a wind farm, Hymas said a utility has to consider wind strength and availability, as well as access to the location and its proximity to transmission lines. Frequently the best place for the right sort of wind is not in cities or towns, he said. "It's often on high peaks, ridge lines, where you need additional transmission to get the energy off the projects and on the grid."

Factors that also must be weighed include how long the wind blows and when.

Over the past 18 months, PacifiCorp has added 400 megawatts of electricity from renewable sources. The vast majority of its wind power is from Wyoming and the Columbia River Gorge of Oregon and Washington, Eskelsen said.

Wyoming hosts most generating capacity among wind power projects in this region because it has better and more reliable wind resources.

A glance at wind maps prepared for the Department of Energy's National Renewable Energy Laboratory tells the story.

Only one place in Utah, a remote locality about 35 miles east of Lynn, Box Elder County, is rated as having wind resources better than Class 3, meaning it has "fair" wind for generating power. That spot in northwestern Utah includes good and excellent resources. On the other hand, Wyoming has huge swaths, particularly from Casper to Cheyenne, that are labeled from Class 4 to Class 7 — "good," "excellent," "outstanding," and "superb." Some of these locations are near highways.

People wishing to reduce or replace dependence on the power grid can purchase wind turbines. However, one's home may not be in a spot with reliable wind. "It's not just, 'Well, the wind seems to blow strong in this area.' You have to consider a number of factors," Hymas explained.

One drawback is that many municipalities have rules limiting the size of a tower, wind-turbine or otherwise.

Geothermal power

Geothermal power is a technique in which water heated by hot spots in the earth is brought to the surface and "flashed" into steam used to turn turbines. According to the Utah Geological Survey, the Blundell geothermal power station at Roosevelt Hot Springs, near Milford, Beaver County, has been operating for more than 20 years.

Water between 271 and 316 degrees Fahrenheit, located between 2,100 feet and 6,000 feet below ground, is tapped for the project. "The plant produces 26 MW (megawatts) gross" and 23 megawatts net, says a site operated by the UGS. That equals the power that could be generated by burning about 300,000 barrels of oil per year, the UGS adds.

The Blundell plant is operated by PacifiCorp. Eskelsen said the company recently installed a heat-recovery generator, which added an additional 11 megawatts.

Small geothermal power plants in the Cove Fort-Sulphurdale region of Beaver County have been used to supply power to Provo, notes the UGS.

The U.S. Department of Energy says on one of its Internet sites, "Agribusinesses in Utah use thermal waters directly to provide heat to greenhouse and aquaculture facilities while avoiding the price fluctuations associated with fossil fuels."

But the projects are small-scale. There's not much chance to have utility-size geothermal power in Utah because "you're limited to the amount of hot water and steam the site can produce," Eskelsen said.

Solar power

Greg Whipple, president and founder of Solar Unlimited, Cedar City, says he has been putting in residential solar power systems for a decade and "it's getting better and better."

New regulations mean that homes with rooftop solar panels can tie into the normal power grid and generate their own solar power. They can use utility electricity when needed, he said. "There's going to be a huge market that's coming in right now."

That's especially true in the Southwest and Southern states, he added. Those states soak up more sunshine from the nuclear furnace in the sky.

"It's cheaper to put it in because there's no batteries involved" when a home remains on the grid. It doesn't need to store power in expensive batteries or other devices so it can be used at night. Instead, in those hours the home switches over to the utility.

"During the day, when you pay more for power at the peak power demand, the solar panels are producing power," Whipple added. In southern Utah, peak power demand surges during the summer's heat, when electricity is needed to run air conditioners and swamp coolers.

He says homeowners with solar panels are happy because eventually their costs go down, the utility is happy because there's less power drawn during peak demand, and "it reduces some of the CO2 emissions" that would be spewed by coal-burning plants.

Asked how much a homeowner can save over 30 years by using solar power, Whipple said he did not want to analyze it that way because utility bills are complicated. Rather, "we can look at how much (of the power bill) it can offset and how much power the solar will produce."

After rebates and tax breaks, he said, a homeowner will break even in 15 years or less.

"The solar panels come with a 25-year warranty on average, with a life expectancy of 50 years or better." Solar panels produced by Bell Labs in 1954 are still meeting specifications, Whipple said.

But today's photovoltaic cells, the kind that cover rooftops in sunny areas, are too expensive to use on an industrial scale. Their cost would be off the scale for that, Eskelsen said.

However, concentrated solar power systems, which use mirrors to focus the sun's light, are not as expensive as photovoltaics.

In southern California's Mojave Desert, nine gigantic solar power plants are to be linked together into a system that can produce about 553 megawatts of electricity. The "Mojave Solar Park" system uses an extensive network of curved mirrors that focus the sun's heat on long pipes filled with fluid. The heated liquid turns turbines that produce electricity, which will be sold to Pacific Gas and Electric, San Francisco.

The system, being built by Solel Solar Systems, Israel, "is now the world's largest single solar commitment," says a PG&E press release.

Intense desert sunlight and the fact that comparatively little rain falls in the Mojave, help make the system successful. Yet even concentrated solar power may be too expensive to offset much of the national demand.

A California Energy Commission draft report, dated June 2007, says existing generating costs for coal-powered plants averages just below $40 per megawatt-hour, while cost of new power plants would rise to just above that. New geothermal systems would cost more than $60 per megawatt-hour; new wind farms at Class 5 sites would boost the price of power by a few more dollars per megawatt-hour, and new nuclear plants would cost around $75 per megawatt-hour.

The "concentrating solar" system, like that used in the California desert, comes in at an estimated $180-plus per megawatt-hour.

New capacity is costly

"The current cost of Rocky Mountain Power's generation is around $35 a megawatt-hour," Eskelsen said. But if the utility were to build a new coal-fired plant, using the efficient pulverized-coal technology, "that would cost you $60 to $65 a megawatt-hour."

Compared with recent years' prices, "the cost of materials is huge — the cost of steel, concrete, all metals." Even adjusted for inflation, the price rise for materials has been spectacular, he said.

"In 2003 you could get a wind turbine for $1 million. Now it will cost you $2 million, and almost all of this is for the cost of steel and concrete." According to Rocky Mountain Power, in 2000, steel cost $425 per ton, and in 2007 it was $893 per ton.

"China and Europe are competing not only for materials and finished manufactured goods, but also for engineering and engineering and labor expertise to actually build these projects," Eskelsen said.

"Anything we build today is going to be at least twice as expensive as what we're using now."

E-mail: bau@desnews.com